REMARKS

Claims 1-60 are pending.

I. Amendments

The cross-reference to a parent application has been amended. Paragraph [0025] was amended consistent with original Claims 23 and 33. Paragraph [0031] was amended consistent with original Claim 20. Claim 20 was amended as supported by original paragraph [0031].

Claim 17 was amended to remove superfluous language from the preamble. Claims 17 and 30 were also amended to more clearly provide antecedent basis.

New Claim 59 was amended to recite the melting point range of the nickel-tin alloy metal layer as supported by paragraph [004] of the present application which explains brazing, by definition, employs a filler metal or alloy having a liquidus above 450°C and below the solidus of the base metal.

New Claim 60 was added to recite a thickness feature for the NiSn plated layer from Claim 6 but depend from Claim 43.

It is respectfully submitted no new matter is presented by the above amendments.

II. Priority

Applicant thanks the Examiner for the reminder to file the priority document. A copy of the priority document is concurrently filed with this Amendment.

III. Specification

Applicant thanks the Examiner for the suggestion to update the Cross Reference to Related Application section of the application and has made the suggested amendment.

The specification was amended to recite the Si range of original Claim 20. Also, Claim 20 was amended to recite the Si range from original paragraph [0031].

The specification paragraph [0025] was amended to recite the features of Claims 23 and 33.

IV. 35 USC 102/103

Claims 43 and 51 to 57 stand rejected under 35 USC 102(b) as being anticipated, or in the alternative under 35 USC 103 as being unpatentable, in view of US 3,242,565 to North et al.

A. North et al. Does Not Teach a Brazing Alloy

The structure of the assembly of Claim 43 differs from the structure resulting from North et al. North et al. first plates a component with Ni and then plates the component with tin and bonds by heating in a hot oil bath in a temperature range which, as explained below, is soldering. In contrast, present Claim 43 recites a NiSn alloy layer made according to Claim 17 from a plating bath containing both tin and nickel and components of the assembly are joined by brazing.

North et al. is primarily concerned with joining stainless steel to aluminum, which is only one of the present embodiments (see, e.g. Claim 54). The joining is achieved by using the tin layer and hot dipping the parts in a tin fusing bath of hot oil at 500° to 525°F (about 260-273°C), see, column 1, lines 51-52 and column 3, lines 5-6, which can be qualified as soldering. In contrast, in the present invention the components are joined by brazing. Soldering and brazing are distinct joining techniques; see section [004] of the present application. This explains brazing, by definition, employs a filler metal or alloy having a liquidus above 450°C and below the solidus of the base metal. Brazing is distinguished from soldering by the melting point of the

filler metal: a solder melts below 450°C. Soldering processes are not within the field of the present invention.

Applying the relatively low temperature disclosed by North et al. if using the presently claimed brazing sheet product would not result in melting the clad layer (as brazing employs a temperature above 450°C), and consequently would not achieve a joint between two metal parts.

North et al. employs the tin as the filler to achieve a joint. Tin has a melting point and boiling point of respectively about 359°F (181°C) and 460°F (237°C), see column 2, line 64-65. In contrast, in the present invention the filler is made up primarily by the clad layer of an aluminum alloy comprising silicon in an amount in the range of 4 to 14 wt.% and only further comprising a thin nickel-tin alloy layer. The role of the tin in this layer is to improve the overall post-braze corrosion performance of the brazed product (see paragraph [018] of the present application), as a clad layer of AlSi with a layer of only nickel has a limited corrosion performance (see paragraphs [0010] and [0011] of the present application).

According to North et al. a thin tin coating is applied by means of electro-plating onto the nickel followed by drying (see column 1, line 48-51). According to the present inventors an upper layer of pure tin metal (as would be achieved by North et al.) is sensitive to progressive oxidation in pre-braze conditions, thus adversely affecting the subsequent brazing process. However, by applying a Ni-Sn alloy layer as in the present invention a thin stable surface oxide film in air is formed (see section [0020] of the present specification). This problem and its solution are neither mentioned nor suggested by North at al. resulting in considerable advantages over the prior art.

Thus, it is respectfully submitted this rejection is overcome.

B. Dependent Claims

It is respectively submitted Claims 51 and 52 further distinguish over North et al., by reciting, respectively, (1) joining by means of in an inert atmosphere in the absence of a brazing flux material and (ii) joining by means of a brazing operation using a vacuum. In contrast, North et al. discloses fusing its assembly of parts in a tin fusing bath of hot oil at 500° to 525°F, as stated at col. 1, lines 51-53.

New dependent Claim 59 expressly recites this brazing temperature range.

New dependent Claim 60 recites the product made according to Claim 17 (hereinafter "the product") being joined by brazing has a layer of nickel-tin alloy at most 2.0μm thick. In contrast, North et al., col. 2, discloses each electroplated layer must be ≥ 0.0003 inch (7.62μm) of Ni and another 0.0003 inch (7.62μm) of Sn. Thus, the structure of the assembly of Claim 60 will differ from the structure of the assembly of North et al. For example, at least away from a joint, the product's NiSn cladding layer thickness would be thinner than North et al.'s cladding layer thickness.

V. Obviousness-type Double Patenting

Claims 1 to 5, 10 to 16, 42 and 44 to 50 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 to 17 and 20 to 28 of US 6,796,484 B2 to Wittebrood et al. in view of US 3,242,565 to North et al.

As explained above, North et al. discloses a soldering alloy, not a brazing alloy. Thus, it does not make up for the failure of the claims of US 6,796,484 B2 to Wittebrood et al. to particularly specify the usage of a layer of nickel-tin alloy as claimed by applicants. Thus, it is respectfully submitted this rejection is overcome.

VI. Allowable Subject Matter

Applicant thanks the Examiner for indicating Claims 6 to 9 are objected to as being dependent on a rejected base claim, but would be allowable if rewritten in independent form.

Applicant thanks the Examiner for indicating Claims 17 to 41 and 58 are allowed.

VII. Conclusion

In view of the above it is respectfully submitted all objections and rejections are overcome. Thus, a Notice of Allowance is respectfully requested.

Respectfully submitted,

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